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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/235,319	01/22/1999	RICHARD M. UBOWSKI	IYENGAR8-10	4856

7590 05/21/2003

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EXAMINER	
TRAN, CON P	

ART UNIT	PAPER NUMBER
2644	7

DATE MAILED: 05/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/235,319	UBOWSKI ET AL.	
	Examiner	Art Unit	
	Con P. Tran	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1-3,8,9,14,22-24, and 27-28** are rejected under 35 USC 103(a) as obvious over Park (5,502,217) considered with Admitted prior art, Figure 6, instant Application 09/235,319 (hereinafter, "Admission").

Park shows (Fig 3) a single echo canceller which is reconfigurable to serve as a hybrid or an acoustic echo canceller (col. 3, lines 50-61). In Figure 4, it is shown that the sampler 400 is switchable to sample either the transmit path (for hybrid echo cancellation) or the receive path (for acoustic echo cancellation). The switching or switched state of 400 inherently constitutes a "register" which stores the current switching state. It is also true that if sampler 400's signal source is switchable, which it is, then there would inherently be a means to control the switching state. Whether or not this is a manual switch, a digital latch controlled via a microprocessor, etc., is not

disclosed, but nonetheless some such means must be present. Such means which controls the switching state of 400 is itself inherently a register.

Since the switching state of 400, and the inherent control register thereof (be that the state of 400 itself, a manual switch which controls the state of 400, or some other switched-state controlling means as discussed above) determines whether or not the echo canceller is used as a hybrid or acoustic echo canceller, and thus configures the echo canceller per se as one of a hybrid or acoustic echo canceller.

It is clear from Park that whichever path is chosen as a signal source for 400, the echo span is determined (Figs 4 and 5) and sent to the echo canceller to control it in a suitable manner to cancel the echo.

The echo canceller per se is shown as a block 301, generally connected between the transmit and receive lines.

The details of this are not shown, since the entire disclosure focusses on being able to do either hybrid or acoustic echo cancellation, it must be deemed that 301's input and output paths are configured appropriately in conjunction with the switching state of 400. This is what is suggested to one of ordinary skill, since the device would not be operable (or make sense) if, for example, the sampler 400 were detecting transmit path to measure the hybrid echo, but the actual echo canceller were switched or wired in the acoustic echo cancelling configuration.

However, Park does not explicitly disclose an application of switchable source 400 in wireless device. Thus one of ordinary skill would have been motivated to seek a wireless embodiment in order to apply hybrid or acoustic echo cancellation of an actual

working arrangement taught by Park. Such embodiments would have been any known conventional cordless telephone equipment such as one of Admission in the same field of endeavor.

Admission teaches a cordless handset 602 includes acoustic echo canceller 606 and a base unit 604 includes hybrid echo canceller 608 (see Fig. 6, page 3, lines 15-25) in order to optimize echo cancellation circuits (see Park, col. 2, lines 24-25).

Therefore, it would have been obvious to one of ordinary skill in the art, at the time the invention was made to include within the Park a cordless telephone as taught by Admission for the purpose of optimization echo cancellation circuits as suggested by Park in column 2, lines 24-25.

Claims 1-3, and 23-24 are thus met in view of the above discussion. **Claim 8** is also met since the switching state of sampler 400 determines whether a hybrid or acoustic echo path is analyzed, and, as discussed above, the delay value or span is passed to the echo canceller, which one of ordinary skill would understand to mean that it is configured in conjunction with the chosen hybrid or acoustic echo cancellation task. Thus one of two modes, hybrid or acoustic, is chosen by the state of "register" 400 or its inherently-present state-control means, be that manual switch or electronic register such as a latch. **Claim 9** is clearly met since the device is clearly reconfigurable for use in hybrid or acoustic echo cancellation. **Claim 14** is met since Figure 3 of Park shows a microphone and a telephone line. The microphone output goes out on the transmit path, and thus would be selected by 400 in one mode, and the receive path is the telephone line, which would be selected by 400 in the other mode.

Claims 22, and 27-28 are met since the wireless device of Park, Admission combination is clearly "for reconfiguring" an acoustic echo canceller in cordless handset, and a hybrid echo canceller in base unit.

3. **Claims 6,7,15,16,18,19, and 15-26** are rejected under 35 USC 103(a) as obvious over Park considered with Admitted prior art, Figure 6 (Admission), and Iyengar (5,663,955).

Capabilities of Park in view of Admission have been discussed above. Iyengar uses two separate echo cancelling filters, but he only adapts coefficients of one at a time. This is because no adaptation is permitted during double talk, and the other two states are simply far end talk or near end talk.

During near end talk, hybrid echo cancellation is needed since there is no acoustic echo at the near end which originates from the far end, but the near end speech is transmitted to the far end via the hybrid. During far end talk, acoustic echo cancellation is needed, but no net signal should be going into the hybrid since there is no near end speech, and the far end echo is cancelled by the acoustic echo canceller.

As a result, it would have been obvious to operate echo canceller of Park in view of Admission in the acoustic cancellation mode during far end talk (Fig 3 shows the acoustic echo path) and in the hybrid echo cancellation mode during near end speech.

Iyengar teaches the detection of the transmit or receive state, and setting the appropriate adaptation mode, as well as a common memory which stores coefficients of

whichever mode is being adapted. It would have been obvious to one of ordinary skill at the time of filing implement a transmit/receive state detector and necessary memory and software in Park, Admission combination to thus implement the correct echo cancellation during either one of the transmit state, for the purpose of having an echo canceller which takes care of the predominant echo in both states using only one echo canceller which is effectively time shared.

Thus the language of **claims 15, and 25-26** "reconfiguring" an acoustic echo canceller in cordless handset, and a hybrid echo canceller in base unit is met. **Claim 16** is met since the span length is determined by Park and used to change the span of the echo canceller itself.

If, on the other hand, the system of Park, which appears to consist essentially of blocks 301 and 302 of Figure 3, were not constructed to be automatically used for transmit and receive modes in the operable sense (rapidly switching modes in step with the conversation), then it would simply have been obvious to switch it manually, and leave it in one or the other mode as desired. This certainly would have been suboptimal, which suggests that one of ordinary skill would have been motivated to set the system up to automatically reconfigure as the conversation mode switches from transmit to receive.

Regarding **claim 6**, as noted, during double talk, Iyengar indicates that adaptation should stop, otherwise divergence may occur. Thus it would have been obvious in the overall system of Park to stop tap update during double talk, and to restart tap update when double talk ceases, thus constituting an operable

reconfiguration. This would have been another aspect of the overall or total needed control of a system (such as Park) which uses LMS adaptive filters to control echo. The entire control state of various such parameters as were known in adaptive echo cancellers, such as update-taps-or-not, transmit/receive mode, value of mu (see rejections infra), etc. would inherently have collectively constituted a "register".

Claims 18 and 19 are also met in view of the discussions above regarding tap update inhibition and echo canceller mode.

4. **Claims 12 and 13** are rejected under 35 USC 103(a) as obvious over Park considered with Admitted prior art, Figure 6 (Admission), further considered with Velardo (5,587,998) and Danstrom (4,582,963).

Park in view of Admission does not specifically describe his echo canceller per se (i.e., the part with an FIR and an adaptive tap weight update algorithm and any pre- or post- processing). Thus one of ordinary skill would have been motivated to seek more detailed embodiments in order to supply an actual working echo canceller for Park, Admission in combination. Such embodiments would have been any know echo canceller, such as those of Danstrom or Velardo. It would have been obvious to use either one of Danstrom or Velardo's teachings for the purpose of supplying a "working", or perhaps a more advanced echo canceller for Park, Admission, Iyengar in combination.

Danstrom is a typical full-band echo canceller, whereas Velardo is clearly a subband-based echo canceller.

It would have been obvious, in fact, to supply various possible known features in any echo canceller, and to switchably select any one, or any known combination of features, for use at any time. See Duplan Corp. v. Deering Millikan, 197 USPQ 342 (see #94).

Thus in some situations, subband echo cancellation may be more suitable than full band, and thus it would have been obvious to arrange to alternately switch between the two configurations for the purpose of using the most suitable technology at any time.

Thus it would have been obvious using any known means to arrange in block 301 of Park, Admission in combination to alternately switch between various known configurations, which would have included full band or subband cancellation; this principle would also have applied to other know features of echo cancellers, such as values for mu, the span length, etc. **Claims 12 and 13** are thus met. Such a switching arrangement, even were it merely manual, would have met the language "operably reconfigurable" of **claim 13**.

5. **Claim 21** is rejected under 35 USC 103(a) as obvious over Park considered with Admitted prior art, Figure 6 (Admission), considered with Iyengar (5,663,955), further considered with Velardo (5,587,998) and Danstrom (4,582,963).

Park of the Park, Admission, Iyengar combination does not specifically describe his echo canceller per se (i.e., the part with an FIR and an adaptive tap weight update algorithm and any pre- or post- processing). Thus one of ordinary skill would have been motivated to seek more detailed embodiments in order to supply an actual working echo

canceller for the Park, Admission, Iyengar combination. Such embodiments would have been any know echo canceller, such as those of Danstrom or Velardo. It would have been obvious to use either one of Danstrom or Velardo's teachings for the purpose of supplying a "working", or perhaps a more advanced echo canceller for Park, Admission, Iyengar.

Danstrom is a typical full-band echo canceller, whereas Velardo is clearly a subband-based echo canceller.

It would have been obvious, in fact, to supply various possible known features in any echo canceller, and to switchably select any one, or any known combination of features, for use at any time. See Duplan Corp. v. Deering Millikan, 197 USPQ 342 (see #94).

Thus in some situations, subband echo cancellation may be more suitable than full band, and thus it would have been obvious to arrange to alternately switch between the two configurations for the purpose of using the most suitable technology at any time.

Thus it would have been obvious using any known means to arrange in block 301 of Park to alternately switch between various known configurations, which would have included full band or subband cancellation; this principle would also have applied to other know features of echo cancellers, such as values for mu, the span length, etc. **Claim 21** is thus met. Such a switching arrangement, even were it merely manual, would have met the language "operably reconfigurable" of claim 13.

6. **Claims 10 and 11** are rejected under 35 USC 103(a) as obvious over Park considered with Admitted prior art, Figure 6 (Admission), further considered with Velardo (5,587,998) and Sih (5,687,229).

These claims refer to the features of using center clipping either in full band or subband echo cancelling.

Sih teaches the known use of full band center clipping (114 of Figure 1, and his improved version with comfort noise, 164 of Fig 5), while Velardo teaches the use of subband center clipping (Fig 4, etc.)

Use of any of these in the echo canceller 300 of Park, Admission combination in a switchable manner, be it manual or electronically controlled via microprocessor or pipeline processor (i.e., the several methods know to those of ordinary skill in the art) would have been obvious, for the purpose of making the unit suitable for many situations, as well as under the doctrine in Duplan Corp. v. Deering Millikan, 197 USPQ 342 (mentioned supra).

7. **Claim 20** is rejected under 35 USC 103(a) as obvious over Park considered with Admitted prior art, Figure 6 (Admission), considered Iyengar (5,663,955), further considered with Velardo (5,587,998) and Sih (5,687,229).

These claims refer to the features of using center clipping either in full band or subband echo cancelling.

Sih teaches the known use of full band center clipping (114 of Figure 1, and his improved version with comfort noise, 164 of Fig 5), while Velardo teaches the use of subband center clipping (Fig 4, etc.)

Use of any of these in the echo canceller 300 of Park, Admission combination in a switchable manner, be it manual or electronically controlled via microprocessor or pipeline processor (i.e., the several methods know to those of ordinary skill in the art) would have been obvious, for the purpose of making the unit suitable for many situations, as well as under the doctrine in Duplan Corp. v. Deering Millikan, 197 USPQ 342 (mentioned supra).

8. **Claims 4 and 5** are rejected under 35 USC 103(a) as obvious over Park considered with Admitted prior art, Figure 6 (Admission), further considered with Sih (5,687,229).

Sih teaches the use of variable step (mu) size, for purposes of controlling adaptation speed and stability, according to a state determined by the usual considerations, such as near end speech, far end speech, etc. Column 15, lines 43 + describe the general situation in which the LMS adaptive filter is given mu=1 initially and this value is adjusted downward as ERLE rises; this leads to reasonably rapid convergence and a lower steady-state error at convergence. It would have been obvious in Park, Admission combination to implement this know method of achieving these desirable goals—otherwise, the filter convergence speed and steady state error would have been suboptimal in regard to the known standards in the art. Thus the

control register state would also include the current value of mu, which would change periodically, such as when switching from hybrid to acoustic cancellation mode and vice versa, as well as during convergence in either one of those modes.

9. **Claim 17** is rejected under 35 USC 103(a) as obvious over Park considered with Admitted prior art, Figure 6 (Admission), considered with Iyengar (5,663,955), further considered with Sih (5,687,229).

Sih teaches the use of variable step (mu) size, for purposes of controlling adaptation speed and stability, according to a state determined by the usual considerations, such as near end speech, far end speech, etc. Column 15, lines 43 + describe the general situation in which the LMS adaptive filter is given mu=1 initially and this value is adjusted downward as ERLE rises; this leads to reasonably rapid convergence and a lower steady-state error at convergence. It would have been obvious in Park, Admission combination to implement this know method of achieving these desirable goals—otherwise, the filter convergence speed and steady state error would have been suboptimal in regard to the known standards in the art. Thus the control register state would also include the current value of mu, which would change periodically, such as when switching from hybrid to acoustic cancellation mode and vice versa, as well as during convergence in either one of those modes.

Response to Arguments

10. Applicant's arguments with respect to claims 1-22 have been considered but are not persuasive.

11. Applicant asserts on page 7:

> ". . . . Park's echo canceler for use in a speakerphone would require different echo cancellation characteristics than an echo canceler used in a wireless device. An echo cancellation system for use in a speakerphone would not suggest an echo cancellation system for use in a wireless device."

Examiner respectfully disagrees. Although a wireless device would require different echo cancellation characteristics than a speakerphone would, Park in view of Admission teaches echo canceller configurable for handset and base unit as presented in the Office Action (see Park, Fig. 3, col. 3, lines 50-61; Admission, Fig. 6, page 3, lines 15-25).

Applicant further asserts on pages 8 and 9:

> "Iyengar discloses . . . . Using a first and second echo cancelers simultaneously is NOT an echo canceler that is configurable between two modes of operation, . . . Neither Ariyama nor Iyengar, either alone or in combination, disclose, teach or suggest an echo canceler configurable for use in a wireless device, ..."

Examiner respectfully disagrees. Park in view of Admission teaches echo canceller configurable for handset and base unit as presented in the Office Action (see Park, Fig. 3, col. 3, lines 50-61; Admission, Fig. 6, page 3, lines 15-25). Park, Admission, Iyengar in combination teaches detection and setting the adaptation mode of span length (see Iyengar, col. 1, lines 35-45, and col. 7, lines 34-67).

Applicant further asserts on page 10:

> "Velardo teaches selective regulation of individual frequency subbands. Selective frequency regulation is NOT an echo canceler that is configurable between two modes of operation, ... Danstrom fails to disclose an echo canceler that is configurable between two modes of operation, much less an echo canceler configurable for use in a wireless device, ..."

Examiner respectfully disagrees. Park in view of Admission teaches echo canceller configurable as acoustic for handset and hybrid for base unit as presented in the Office Action (see Park, Fig. 3, col. 3, lines 50-61; Admission, Fig. 6, page 3, lines 15-25). Park, Admission, Velardo, Danstrom in combination teaches selection of subband-based, and fullband-based (see Velardo, col. 3, lines 1-22, col. 5, lines 41-65; Danstrom, col. 4, lines 41-66).

Applicant further asserts on page 11:

> "Sih teaches an echo canceler using a plurality of adaptive filters. A plurality of adaptive filters is NOT an echo canceler that is configurable between two modes of operation, much less an echo canceler configurable for use in a wireless device. . . . Neither Park, Iyengar, Velardo nor Sih, either alone or in combination, disclose, teach or suggest an echo canceler configurable for use in a wireless device, ..."

Examiner respectfully disagrees. Park in view of Admission teaches echo canceller configurable as acoustic for handset and hybrid for base unit as presented in the Office Action (see Park, Fig. 3, col. 3, lines 50-61; Admission, Fig. 6, page 3, lines 15-25). Park, Admission, Sih in combination teaches the use of variable step (mu) size, for purposes of controlling adaptation speed and stability (see Sih, col. 13, lines 29-47).

Conclusion

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Con P. Tran, whose telephone number is (703) 305-2341. The examiner can normally be reached on M - F (8:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester W. Isen can be reached on (703) 305-4386. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Customer Service Office at telephone number (703) 306-0377.

cpt CPJ
May 16, 2003

FORESTER W. ISEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600